



United States
Department of
Agriculture

Forest
Service

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Kim Hall
Acting Park Superintendent
Chiricahua National Monument
3063 E. Bonita Canyon Road
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Dear Mr. Evans

On July 10, 2006, Bobbe Fitzgibbon, entomologist with our Forest Health staff, visited the Chiricahua National Monument to do a post-treatment evaluation of Arizona cypress, *Cupressus arizonica*, which had been sprayed with carbaryl to prevent cedar bark beetle, *Phloeosinus cristatus*, infestation; and to evaluate the current beetle activity on the Monument.

Based on an evaluation completed September 20, 2005, a proposal to treat 2 acres of high value administrative land with cut and removal of currently infested trees and preventive spray treatment of 56 trees was submitted to Forest Health Protection (FHP) and approved for funding. On April 24, 2006, after the cutting and removal of infested trees was accomplished, 43 apparently healthy trees were treated with carbaryl. Due to unavoidable delays, treatment occurred after the first beetle flight of the season. Treatment of the remaining trees was not possible due to increasing winds in the direction of inhabited campsites.

All 43 trees were examined for any signs of bark beetle activity. No infestation (Figure 1) was found in 41 of the trees even though trees not treated (Figure 2) in the same area were found to be infested. Only two of the treated trees were found to be infested (Figure 3). These trees could have been infested prior to treatment and the infestation was not visible since infested trees die from the top down.



Figure 2 Untreated tree beside treated.

Post-Treatment evaluation:

95% of the treated trees were found to be healthy. Treatment protected 41 trees on 2 acres in high value recreation, historic and administrative sites.



Figure 1 Healthy treated tree





Figure 3 Infested treated trees.

Biological evaluation:

In the Bonita picnic area 4 untreated trees were dying from the top down and 3 have been cut and removed.

In Far-away picnic area 3 trees were dying.

Current infestation and past mortality have impacted more than 50% of the Arizona cypress on the monument. An additional 5 to 10 % show signs of tip damage in the form of flagging or branch tip mortality where the beetles have attacked them.

Since there are trees currently infested in the vicinity of treated trees, it is recommended that the removal of currently infested trees and preventative spray treatment of trees in high value sites continue until the outbreak of cedar bark beetles subsides.

Biology of *Phloeosinus cristatus*

The cedar bark beetle is native to Arizona, California and New Mexico. The beetles are generally found at endemic levels under the bark of broken branches, weakened, dying or down cypress or juniper. However, under favorable conditions, such as the extended drought we have been experiencing, populations can increase to levels that cause mortality in apparently healthy trees. The outbreak in southeastern Arizona began in 2003 and has been ongoing since that time.

The adults are small reddish brown to black shiny beetles, about 2 to 3 mm. in length. Identification is based on rows of teeth on the elytral declivity. There are 1 to 1.5 generations per year. In spring prior to constructing their egg galleries, newly emerged adults bore into the twigs of healthy trees to feed. Twigs are hollowed out and die causing a condition called flagging where many of the outer twigs turn brown, die and eventually fall from the tree. Adults then bore into the larger branches and trunk of stressed trees, mate and lay eggs in galleries 25 to 75 mm long. Multiple galleries soon girdle the tree. Eventually the tree dies. Unlike other bark beetles that have a preference for certain age classes of trees *Phloeosinus cristatus* will attack all age and size classes

Integrated pest management for this species includes several preventive and treatment methods for protecting high value trees from attack.

1. **Cultural practices** can significantly reduce potential beetle colonization. Maintaining tree health and vigor will reduce the risk of beetle colonization. This is accomplished by slow, deep, infrequent irrigation of susceptible trees species during extended drought periods (April-June or longer) using a drip irrigation system or a soaker hose placed at the drip line of the tree.

2. **Silvicultural treatments.** Although no experimental work has examined relationships between stand conditions (composition of tree species in the stand, tree density, tree size or age) and susceptibility to attack by the cypress bark beetle, any Silvicultural treatments which improve the overall vigor of trees within stands will likely decrease individual tree susceptibility to attack in the long-term. Furthermore, treatments which favor a greater mix or diversity of tree species in a stand will reduce potential impacts caused by beetles.
3. **Sanitation treatment or removal.** Sanitation treatment or removal involves cutting of currently infested trees prior to the beetle maturation and emergence. On site treatments of infested trees include cut and burn, cut and burying, cut and chip, or cut and debark. If an infested tree is to be removed from the site, it needs to be moved a minimum of one mile from the nearest live host type prior to beetle emergence. These treatments will help to reduce beetle populations in localized areas and in individual stands. This can provide some protection to surrounding uninfested trees and stands by removing a large source of attacking beetles. Sanitation removal is only effective at suppressing beetles at the stand level; it is not typically effective on a landscape scale. In addition, this treatment does not address stand conditions that may have contributed to the initial increase of beetle populations.
4. **Protection of high value trees.** Valuable trees in recreation sites or near administrative structures may be sprayed with insecticides labeled for bark beetles to prevent successful attack. Both the trunk and large branches should be sprayed. Attacking beetles die as they attempt to chew through the bark. Preventive sprays are not recommended for trees already attacked. In addition, systemic injections of insecticides have not shown to be effective for bark beetles, either as a preventive or a direct remedial control of bark beetles on pine (Haverty et al. 1996).

Recommendations:

The cedar bark beetle infestation is continuing at a landscape level. Control of the insect in the general forest is impractical, however, protecting high value trees in recreational, historic and administrative areas is feasible. Since the beetle populations continue in outbreak numbers, preventive maintenance of high value trees should be continued. In order to ensure continuing tree vigor protected trees should receive slow deep watering regularly if possible. Prompt cutting and removal or treatment of infested trees should be ongoing. Protective spraying of high value trees previously treated should be continued until the outbreak subsides to protect the initial investment. Targeting other healthy high value trees for protection would be appropriate. Post-treatment review of the project indicated that use of a bucket truck for the treatment would have made application easier and more efficient therefore; it would be advisable to amend the contract for 2007 to include this equipment. Since wind conditions shut down treatment operation prior to completion because of the presence of campers and equipment, it would be advisable to close a portion of the campground for the period of time it would take to spray the trees in that area.

Suppression funds may be available for FY2007 from Forest Health Protection to implement projects related to bark beetle activity in these forest health project areas.

If you have any questions regarding our assessment of current cypress bark beetle activity within the Monument lands, their potential effect on residual standing trees, or our recommendations, please call me at (928) 556-2074.

Sincerely,

/s/ Roberta Fitzgibbon
ROBERTA FITZGIBBON
Entomologist, Forest Health, Arizona Zone

cc: Gilbert Zepeda
Debra Allen-Reid
Joel McMillin
Bobbe Fitzgibbon

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